

REMARKS

At the time the current Official Action was mailed, the Examiner objected to claims 2-7 and indicated that claims 2-7 would be allowable if rewritten in independent form. Applicants thank the Examiner for indicating the allowable subject matter of claims 2-7. The Examiner objected to claim 17 based on a perceived informality. Further, the Examiner rejected claims 1 and 8-20. Reconsideration of the application in view of the remarks set forth below is respectfully requested.

As a preliminary matter, Applicants would like to point out that the PTOL-326 form submitted with the Official Action indicates that claims 1-20 are subject to restriction and/or election requirement. This point was not addressed by the Examiner in the Official Action. Applicants assume that the indication of the restriction requirement was made inadvertently, and therefore, have made no election. If this assumption is incorrect, Applicant's respectfully request that the Examiner specify which claims are subject to restriction/election. Applicants respectfully submit that no restriction and/or election is required in the instant case.

Objections to the claims

The Examiner objected to claims 2-7 as being dependent upon a rejected base claim and indicate that claims 2-7 would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. Applicants thank the Examiner for the indication of allowability of the subject matter separately recited in each of claims 2-7. However, Applicants respectfully submit that claims 2-7 are also allowable based on their dependency to allowable base claim 1. For the reasons set forth below with respect to the rejection of

independent claim 1 under 35 U.S.C. § 102, Applicants respectfully submit that claim 2-7 are currently in condition for allowance, without amendment.

The Examiner objected to claim 17 because of a perceived informality. Specifically, the Examiner stated, “claim 17 recites forming a ‘shingle stack.’ It is believed the applicant meant ‘single stack.’” Office Action, page 2. Applicants hereby confirm that the recitation of a “shingle stack” was intended. Shingle stacks are described in the application as including die stacks wherein upper die may overhang die below them in the stack. Application, page 14. Indeed, Figs. 5C and 5D of the application are cross-sectional views of exemplary shingle stacks in accordance with embodiments of the present invention. In view of the teachings of the present application, applicants respectfully assert that claim 17 does not contain a typographical error and request that the Examiner withdraw the objection to claim 17.

Rejections under 35. U.S.C. § 102

The Examiner rejected claims 1, 9-11, 15, 18 and 20 under 35 U.S.C. § 102 as being anticipated by Blackshear et al. (U.S. Patent No. 6,774,475 B2). Specifically, the Examiner stated:

Claims 1, 9-11, 15, 18, and 20 are rejected under 35 U.S.C. 102(e) as being anticipated by Blackshear (US006774475B2).

Blackshear teaches all of the positive steps of claims 1, 9-11, 15, 18, and 20 in that a stack of at least two semiconductor die are formed (column 4 lines 8-9), and the stack is tested prior to mounting on a packaging substrate (claim 14).

Office Action, page 2.

Applicants respectfully traverse this rejection. Anticipation under Section 102 can be found only if a single reference shows exactly what is claimed. *Titanium Metals Corp. v. Banner*, 778 F.2d 775, 227 U.S.P.Q. 773 (Fed. Cir. 1985). For a prior art reference to anticipate under Section 102, every element of the claimed invention must be identically shown in a single reference. *In re Bond*, 910 F.2d 831, 15 U.S.P.Q.2d 1566 (Fed. Cir. 1990). To maintain a proper rejection under Section 102, a single reference must teach each and every element or step of the rejected claim. *Atlas Powder v. E.I. du Pont*, 750 F.2d 1569 (Fed. Cir. 1984). Thus, if the claims recite even one element not found in the cited reference, the reference does not anticipate the claimed invention.

The present application relates to an improved stacked die module and techniques for forming an improved stacked die module. Application, page 2. Specifically, techniques and embodiments disclosed in the present application address problems with existing design techniques by reducing packaging costs and potential for package damage. *See id.* at 10. In existing techniques, die are typically stacked from the surface of a substrate, requiring multiple iterations and significant handling by die attach machines. *Id.* Such die stacking equipment may be costly, slow and inaccurate. *Id.* Further, with chip design yielding increasingly thinner die, excess handling of individual die in a conventional stacking process may increase the likelihood of damage to die. *Id.* Embodiments of the present invention address these problems by forming and testing a die stack prior to attaching the die stack to a substrate. *Id.* at 12. Accordingly, independent claim 1 recites, in relevant part, “forming a *stack* of *at least two* semiconductor die; and *after the stack is formed*, *testing* the semiconductor die *in the stack*.” (Emphasis added).

Applicants respectfully assert that the Blackshear reference fails to teach each and every element or step of the present claims. For example, in contrast to the present independent claim 1, the Blackshear reference is directed to *individual* memory chip packages that are pre-tested before being mounted on substrates. *See* Blackshear et al., col. 2, lines 46-48. The Examiner cited claim 14 of the Blackshear reference in an attempt to show that the Blackshear reference teaches a “*stack* [that] is tested prior to mounting on a packaging substrate.” Office Action, page 2. However, independent claim 13, from which claim 14 depends, makes it clear that the Blackshear reference is directed to pre-testing of *single* memory chip packages, not a *stack* of *at least two* semiconductor die. In fact, claim 13 in the Blackshear reference recites “a *single* memory chip package mounted on each of said substrates.” (Emphasis added). Accordingly, when claim 14 of the Blackshear reference recites that “said memory chip package comprises a pre-tested memory chip package,” it is referring to a *single* memory chip package, not a *stack* of semiconductor die. Thus, at most, the Blackshear reference discloses testing a “memory chip package,” before stacking the packages to provide the configuration illustrated in Fig. 1 of the Blackshear reference.

With this in mind, it is necessary to determine what is taught by Blackshear, with regard to the disclosed “memory chip package.” While the Blackshear reference teaches that “[a] chip package may include one or many chips,” there is absolutely no teaching or suggestion of a *stack* of *at least two* semiconductor die, much less testing the semiconductor die in the stack after the stack is formed, as recited in the present claims. *See* Blackshear et al., col. 3, lines 41-54. In fact, the embodiment illustrated by Fig. 3 of the Blackshear reference merely teaches a chip package 300 comprising a *single* chip 301 that is coupled to a substrate 302. *Id.* Accordingly,

one of ordinary skill in the art would conclude that the reference to a chip package including “many chips” in accordance with the Blackshear reference would at best comprise a plurality of chips assembled adjacent one another, wherein each chip is coupled directly to the substrate. In other words, in the broadest reasonable interpretation, one of ordinary skill in the art would merely consider the Blackshear reference as disclosing a single substrate having multiple chips coupled directly thereto. Therefore, the Blackshear reference fails to disclose “forming a stack of at least two semiconductor die” and “after the stack is formed, testing the semiconductor die in the stack prior to attaching the semiconductor die to a packaging substrate,” as recited in claim 1.

In view of the deficiencies discussed above, Applicants assert that the Blackshear reference fails to disclose each and every element recited in independent claim 1. Therefore, Applicants respectfully request withdraw of the Examiner’s rejection and allowance of claim 1. Further, claims 9-11, 15, 18 and 20 depend from independent claim 1. Accordingly, Applicants request withdrawal of the Examiner’s rejection and allowance of claims 9-11, 15, 18 and 20 based on their respective dependencies and for the unique subject matter separately recited in each dependent claim.

Rejections under 35 U.S.C. § 103

The Examiner rejected claims 8, 12-13, 16-17 and 19 under 35 U.S.C. § 103(a) as being unpatentable over Jiang et al. (U.S. Patent No. 6,343,019) in view of Blackshear et al. and Pai et al. (U.S. Patent No. 6,503,776). Further, the Examiner rejected claim 14 under 35 U.S.C. § 103(a) as being unpatentable over Jiang et al. in view of Blackshear et al. and Moden (U.S. Patent No. 5,719,440) or Hakey et al. (U.S. Patent No. 6,627,477 B1).

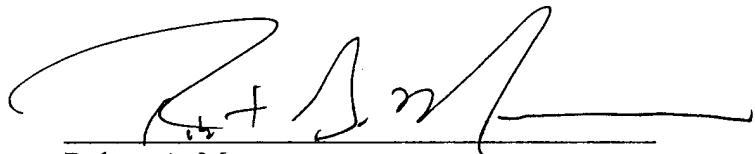
Applicants respectfully traverse these rejections. The burden of establishing a *prima facie* case of obviousness falls on the Examiner. *Ex parte Wolters and Kuypers*, 214 U.S.P.Q. 735 (PTO Bd. App. 1979). Obviousness cannot be established by combining the teachings of the prior art to produce the claimed invention absent some teaching or suggestion supporting the combination. *ACS Hospital Systems, Inc. v. Montefiore Hospital*, 732 F.2d 1572, 1577, 221 U.S.P.Q. 929, 933 (Fed. Cir. 1984). Accordingly, to establish a *prima facie* case, the Examiner must not only show that the combination includes *all* of the claimed elements, but also a convincing line of reason as to why one of ordinary skill in the art would have found the claimed invention to have been obvious in light of the teachings of the references. *Ex parte Clapp*, 227 U.S.P.Q. 972 (Bd. Pat. App. & Inter. 1985).

As discussed above with respect to the rejections under 35 U.S.C. § 102, Applicants assert that independent claim 1 is presently allowable. As discussed in detail above, the Blakcshear reference fails to disclose each of the elements recited in independent claim 1. For this reason alone, Applicants respectfully submit that claims 8, 12-14, 16, 17 and 19, which are dependent thereon, are also allowable. Applicants submit that neither the Jiang reference, the Pai reference, the Hakey reference, nor the Moden reference cures the deficiencies discussed above with respect to the allowable base claim. Accordingly, the cited references, taken alone or in combination, do not disclose all of the presently claimed elements. Thus, a *prima facie* case of obviousness has not been established. Applicants respectfully request withdrawal of the Examiner's rejections under 35 U.S.C. § 103 and allowance of claims 8, 12-14, 16, 17 and 19.

Conclusion

In view of the remarks set forth above, Applicants respectfully request reconsideration of the Examiner's rejections and allowance of all pending claims. If the Examiner believes that a telephonic interview will help speed this application toward issuance, the Examiner is invited to contact the undersigned at the telephone number listed below.

Respectfully submitted,



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